

REMARKS

Applicant appreciates the time taken by the Examiner to review Applicant's present application. This application has been carefully reviewed in light of the Official Action mailed May 9, 2006. This Reply encompasses a bona fide attempt to overcome the rejections raised by the Examiner and presents amendments as well as reasons why Applicant believes that the claimed invention, as amended, is novel and unobvious over the applied prior art. Accordingly, Applicant respectfully requests reconsideration and favorable action in this case.

Claim Status

Claims 1-12 and 22-34 were pending. Claims 1-12 and 22-34 were rejected. Claims 1 and 28 are amended herein. No claim is newly added. By this Amendment, claims 1-12 and 22-34 are pending.

Rejections under 35 U.S.C. § 112

Claims 1-12 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Specifically, the Examiner contented on page 3, paragraph 5, of the Office Action that “the limitation of ‘code for constructing the generic revenue management data model’ is not enabled by the Specification and is considered new matter.” Claims 1-12 are amended herein, rendering this rejection moot. Accordingly, withdrawal of this rejection is respectfully requested.

Rejections under 35 U.S.C. § 102

Claims 1-2, 4-5, 10-12, 22 and 25-29 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication No. 2002/0055865 ("Hammann"). The rejection is respectfully traversed. As mentioned in the previous Reply dated April 25, 2006 ("Previous Reply"), the standard for "anticipation" is one of fairly strict identity. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Thus, Hammann does not anticipate Claims 1-2, 4-5, 10-12, 22 and 25-29 unless Hammann either expressly or inherently describes all the claim limitations as set forth and as arranged in Claims 1-2, 4-5, 10-12, 22 and 25-29.

Before discussing in detail the specific differences between Hammann and embodiments of the invention as claimed in Claims 1-2, 4-5, 10-12, 22 and 25-29, Applicant would like to point out at least one element that is missing from Hammann and all of the prior art of record. As described in the Specification (e.g., paragraph [0020]), embodiments of the invention as claimed in Claims 1-12 and 22-34 are directed to a *generic* revenue management data model for representing revenue management problems. In particular, the *generic* revenue management data model allows multifarious revenue management problems to be expressed in a uniform format (see Specification, paragraphs [0021]-[0022]). None of the prior art of record, including Hammann, teaches how to express multifarious revenue management problems in a uniform format according to a *generic* revenue management data model. Unlike prior revenue management systems, embodiments of the invention implementing the *generic* revenue management data model as recited in Claims 1-12 and 22-34 are suitable for solving a broad range of revenue management problems. Applicant is unable to find the claimed term "*generic* revenue management data model" in Hammann or any of the prior art of record. Additionally, Applicant believes that the claimed invention, as amended, is novel and unobvious over Hammann for at least the following reasons.

As per Claims 1, 12, 22, and 28, Hammann appears to be directed to a type of a Revenue Management (RM) system that helps to match a human user with resources that provide a service to that user and attempts to maximize revenue from transactions. As discussed before, like other prior revenue management systems, Hammann's invention provides a specific and not a *generic* solution. In this case, Hammann's system interfaces and interacts with an actual person at the application layer. It keeps tracks of human requests for services, availability of resources, prices and certain quantities ("marginal values") that measure how valuable resources are. Hammann's system uses calculations performed in a subsystem, called the "Yield Management System (16)", which uses three lists: a resource list 32, a composite resource list 33 and a demand records list 34 (Hammann, paragraph [0138]). Hammann also mentions a conventional schedule. However, unlike embodiments of the invention as claimed in the pending Claims 1-12 and 22-34, Hammann's three lists along with a schedule do not allow multifarious revenue management problems to be expressed in a uniform format for further data manipulation and mapping. For example, the display in FIG. 4 of Hammann represents the results of a prospective scheduling of activities (Hammann, paragraphs [0127]-[0128]). Claims 1 and 28 are amended herein to particularly point out that in embodiments of the invention multifarious revenue management problems are mapped to a tangible storage medium (e.g., a memory or a database) according to the generic revenue management data model so that they are expressed in a uniform format of the generic revenue management data model. No new matter is introduced. Support for the amendment can be found in the Specification as originally disclosed (see Specification, paragraphs [0022]-[0023]).

Applicant notes that Hammann's three lists (i.e., resource list 32, composite resource list 33 and demand records list 34) are not identical to the data structures as claimed in the pending Claims 1-12 and 22-34 (see *also*, Specification, paragraphs [0033], [0052]-[0055], etc.). Furthermore, the blocks of data in each of Hammann's lists are structured differently, have different purposes, and serve different functions. In

embodiments of the invention, data fields in the data structures can keep track of the actual physical capacity and the maximum capacity, allowing overbooking considerations (*id.*). They can also store resource weights, allowing the manipulation and mapping of more complex networks and relationships (*id.*). A fifth data structure can be implemented as an option to keep resource demand data for individual resources (*id.*). In addition to allowing the total demand to depend on time pattern, the resource demand can be represented by a generic resource demand function that can depend on parameters, including time. The dependency on time can also be represented in the data structure of the generic RM data model (e.g., in the resource demand time pattern value entity 480 as described in the Specification).

Also, the contents of the data fields are different. Although a definition of the term "demand forecast" is provided, Hammann does not appear to store forecasted demands (Hammann, paragraphs [0075] and [0142]). Contrastingly, in embodiments of the invention as claimed in Claims 1-12 and 22-34, demand forecasts for each entity are stored in the data structure.

Moreover, the data structures as claimed in all pending Claims 1-12 and 22-34 are not limited by the characterization of Hammann's data structures (Hammann, paragraph [0143]). Particularly, unlike Hammann, the association of demand to resource is not built in into a data field of the demand records. In embodiments of the invention as claimed in Claims 1-12 and 22-34, the association between the resource bundles and the network demands is kept separately in the forth data structure. Having this association in a separate data structure provides more flexibility and is technologically more advanced since it follows the paradigm of relational databases.

Hammann mentions using a generic control structure to iteratively determine marginal values regardless of the optimization function employed. However, Hammann explicitly states that "it is critical that the optimization function employed generate[sic] a continuous demand curve" (Hammann, paragraph [0145]). The embodiments of the

invention as claimed in Claims 1-12 and 22-34 do not contain such a requirement. Because revenue management problems are expressed in a uniform format of the *generic* revenue management data model, many optimization functions can be used in embodiments of the invention, irrespective of whether they produce a continuous demand curve or not.

In the field of revenue management (RM), demand often has a discrete nature. For example, in the airline RM, demand is usually dependent upon which of the finite number of classes are open (hence a discrete demand curve arises if demand is treated as price-sensitive). Thus, upon reviewing Hammann, one skilled in the art would have recognized that most of the algorithms used in the airline RM do not follow the control flow described in Figures 7 and 8 of Hammann. For example, the methods described in the several articles cited by the Examiner, particularly Talluri and van Ryzin (1998) and Feng and Xiao (2000), quite explicitly use demand that comes in a number of discrete classes or at a discrete number of price points. This type of demand does not and cannot produce a continuous demand curve but a discrete one.

What is more, the “generic control structure” of Hammann pertains to a process flow in which marginal values are determined (Hammann, Figures 7 and 8), which is submitted to be completely different from the *generic* RM data model as recited in Claims 1, 12, 22, and 28. According to Hammann, the determined marginal values are then combined in a specific way to produce the composite resource marginal value (Hammann, paragraphs [0145]-[0146]). Thus, it seems that Hammann uses the term “generic” to describe an iterative process in which the marginal values are determined. The optimization functions are not generic. The lists and schedule used by the optimization functions are also not generic. There isn’t a *generic* revenue management data model or any generic data structure in Hammann at all.

With respect to Claim 28, Applicant specifically disagrees with the Examiner’s statement on paragraph 5 of the Office Action. With the four data structures particularly

defined in Claim 28, "mapping revenue management problem data to the database or the memory according to the generic revenue management data model" does not whatsoever amount to "sending the data to the database for storage," as gravely simplified by the Examiner. The Examiner's interpretation did not seem to consider the claim limitation of "according to the generic revenue management data model". As submitted in the Previous Reply, the RM problem data is decomposed into different data representations and correspondingly stored *in accordance with* particular data structures of a generic RM data model. Thus, the mapping function as recited in claim 28 is directed to *how* RM problem data can be stored on a tangible storage medium. As particularly described in the Specification (e.g., paragraphs [0021]-[0024]), in one embodiment, the mapping function (implemented in one example as mapping software program 121) can map the revenue management problem data to a database (implemented in one example as database 123) in the uniform format of the claimed generic revenue management data model (implemented in one example as generic revenue management data model 125). In other words, the mapping function operates to organize data according to the claimed generic revenue management data model into specific data structures that are related and associated in a manner to serve a very clear purpose: RM optimization. When a particular solver program applies an algorithm to the data thus stored in the generic revenue management data model, the mapping function can map the optimization results to the database and/or the generic revenue management data model (*id.* at paragraph [0024]). Hammann neither teaches nor suggests all the claim limitations of Claim 28.

As per Claim 2, Hammann does not teach "each association residing the forth data structure." As discussed before, even if Hammann's conventional schedule can be seen as representing some kind of association between other lists, the association itself is not part of the data structure. That is, the association does not *reside in* the fourth data structure. Accordingly, Hammann fails to anticipate Claim 2.

As per Claims 4 and 25, the cited paragraphs [0145] and [0146] of

Hammann do not appear to be applicable to data structures or contents thereof. It is not clearly understood how Hammann's control process flow is equivalent or even relevant to data fields of a data structure. Accordingly, Hammann fails to anticipate Claims 4 and 25.

As per Claim 5, Hammann does mention airline industry in the cited paragraphs of [0009], [0029], and [0184]. However, Hammann does not teach, as required by 35 U.S.C. § 102, that "the network is an airline network," as the Examiner has alleged. For example, in the cited paragraph of [0029], Hammann merely mentions services rendered by airlines. In the cited paragraph of [0184] Hammann merely mentions an assumption commonly used in leg-based airline yield management systems. Accordingly, Hammann fails to anticipate Claim 5.

As per Claims 10-11 and 26-27, Hammann does not teach, as required by 35 U.S.C. § 102, "a fifth data structure representing a resource demand." Additionally, Applicant cannot find in the cited paragraph of [0142] of Hammann where "the demand records list (34) ... stores the demand forecast for the composite resource," as the Examiner has alleged. Even if the doctrine of equivalence were applicable under 35 U.S.C. § 102, there isn't any data structure in Hammann that could be held equivalent to the fifth data structure as set forth in Claims 10-11 and 26. Claim 27 is traversed for similar reasons. Additionally, Hammann's optimization functions as described in the cited paragraphs of [0145]-[0146] do not appear to "generate the resource demand based on results of the network optimization," as set forth in Claim 27. Hammann discloses, in paragraph [0145], that it is "critical that the optimization function employed generate a continuous demand curve, preferably as a function of marginal value (expressed in units, typically dollars) and supply (expressed in transaction service capacity)." Hammann explicitly states that the "continuous optimization function returns a marginal value for a composite resource using the current resource" (Hammann, paragraph [0150]). The marginal value is not a demand and the continuous optimization function of Hammann does not generate any "resource demand based on



results of a network optimization,” as claimed in Claim 27. Accordingly, Hammann fails to anticipate Claims 10-11 and 26-27.

As per Claim 29, Hammann’s basic control structure is not applicable and plainly irrelevant. Hammann seems to use the term “control structure” to describe an iterative process in which the marginal values are determined. It refers to how different processes (“blocks”) work and in what sequence (Hammann, Figures 7 and 8). As discussed above, Hammann makes no mention about a generic RM data model. Hammann makes no mention about expressing multifarious revenue management problems in a uniform format of a generic RM data model. Hammann’s optimization functions are not generic. The lists and schedule used by Hammann’s optimization functions are not generic. There isn’t a *generic* revenue management data model or any generic data structure in Hammann at all. Accordingly, Hammann fails to anticipate Claim 29.

In view of the foregoing, Claims 1-2, 4-5, 10-22, and 25-29 are respectfully submitted to be patentable over Hammann under 35 U.S.C. § 102(e). Accordingly, withdrawal of the rejection is respectfully requested.

Rejections under 35 U.S.C. § 103

Claims 3, 6-9, 23-24, and 30-31 were rejected under 35 U.S.C. §103(a) as being unpatentable over Hammann in view of U.S. Patent No. 6,263,315 ("Talluri"). Claims 32-34 were rejected under 35 U.S.C. §103(a) as being unpatentable over Hammann in view of Talluri and further in view of U.S. Patent No. 6,721,714 ("Baiada"). The rejection is respectfully traversed. Portions of the Previous Reply which are still pertinent to the rejections based on Talluri and Baiada are hereby incorporated herein.

As submitted in the Previous Reply, Talluri does not teach or suggest a *generic* revenue management data model. As submitted above, Hammann also does not teach or suggest a *generic* revenue management data model. Consequently, Hammann and Talluri fail to teach a *generic* revenue management data model. To establish a *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). See also, MPEP § 2143.03. Accordingly, Applicant respectfully submits that Claims 1, 6-9, 23-24, and 30-31 are patentable over Hammann and Talluri under 35 U.S.C. §103(a). For similar reasons, Claims 32-34 are submitted to be patentable over Hammann and Baiada under 35 U.S.C. §103(a). Applicant further respectfully submits the following for the Examiner's consideration.

As per Claims 3 and 24, as submitted before, Talluri appears to be concerned with one particular way of expressing one type of optimal control (i.e., multidimensional threshold value lookup tables) that might be produced by an optimization function. Talluri does not teach what data structure is needed to calculate those final controls. Talluri does mention demand, airlines, itineraries, flight leg, etc. However, like Hammann, Talluri simply meets the terms and not the invention. As discussed in the Previous Reply, Talluri merely uses generic terms (e.g., "itinerary demand", etc.) that have existed in the industry for a long time to describe a new way of allocating multiple resources. The Examiner stated that Hammann does not teach maximum, physical and expected use capacity. Applicant agrees. The Examiner seems to believe that Talluri

teaches these limitations. Applicant respectfully disagrees. First, neither Hamman nor Talluri suggests the desirability and hence the motivation to modify one another so as “to provide a means for measuring the resources and effectively utilizing them to meet demand,” as the Examiner stated on page 8 of the Office Action. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

Second, the problems that Hammann and Talluri are trying to solve are different and the solutions are different. On the one hand, Hammann is directed to managing human-factor resources and requires optimization thereof to generate a continuous demand curve. On the other hand, Talluri is directed to managing revenues for flight-leg resources which have discrete threshold values associated therewith and requires the use of multidimensional lookup tables. It has been found that a person having ordinary skill in the art would not reasonably have expected to solve different problems. *In re Clay*, 966 F.2d 656, 23 USPQ2d 1058 (Fed. Cir. 1992). See also, MPEP 2141.01(a)II. Therefore, the combination of Hammann and Talluri would not have been obvious to one of ordinary skill in the art at the time of the invention, operability of such a combination notwithstanding.

Third, Claims 3 and 24 are directed to elements of a data structure. Contrastingly, Talluri is cited for elements of a reservation booking system. Even in the broadest reasonable interpretation, elements of a reservation booking system do not read on elements of a data structure.

Forth, Talluri appears to use maximum capacity interchangeably with physical capacity. The *generic* revenue management data model as claimed in the present invention distinguishes these two terms and utilizes them for overbooking. Applicant disagrees with the Examiner’s statement on page 8 of the Office Action that “expected use of the resources [as claims in Claims 3 and 24] would be equivalent to the reservation yield and the database maintaining historical records of all the reservations

as it performs an identical function in substantially the same manner with substantially the same results.”

Applicant further respectfully disagrees with the Examiner’s statements regarding Claims 6-9, 23, and 30-34 for similar reasons as discussed above. Moreover, Applicant respectfully submits that Baiada appears to be directed to managing movement of planes and operators on the ground that support aircraft operations. Baiada seems to be concerned with supply chain optimization and not particularly demand optimization. Thus, Hammann and Baiada are trying to solve different problems with different solutions. In other words, there could be no reasonable motivation to combine Hammann and Baiada. Further, Applicant would like to point out that lacking a *generic* RM data model as claimed in Claims 1, 22, and 28 and lacking the particular logical and structural relationships between the elements thereof, the combination of Hammann and Talluri and the combination of Hammann, Talluri, and Baiada at best meet the terms and not the invention as set forth in Claims 6-9, 23, and 30-34.

In view of the foregoing, claims 3, 6-9, 23-24, and 30-34 are submitted to be patentable over Hammann, Talluri, and Baiada, individually and in combinations, under 35 U.S.C. § 103(a). Accordingly, withdrawal of this rejection is respectfully requested.

Conclusion

Applicant has now made a bona fide attempt to place the present application in condition for allowance. Favorable consideration and a Notice of Allowance of all pending claims is therefore respectfully solicited. Other than as explicitly set forth above, this reply does not include any acquiescence to statements, assertions, assumptions, conclusions, or any combination thereof in the Office Action. The Examiner is invited to telephone the undersigned at the number listed below for discussing an Examiner's Amendment or any suggested actions for accelerating prosecution and moving the present application to allowance. The Director of the U.S. Patent and Trademark Office is hereby authorized to charge any fees or credit any overpayments to Deposit Account No. 50-3183 of Sprinkle IP Law Group.

Respectfully submitted,

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